

MATERIAL SAFETY DATA SHEET

SRM Supplier: National Institute of Standards and Technology
Standard Reference Materials Program
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Gaithersburg, Maryland 20899

SRM Number: 3135a
MSDS Number: 3135a
SRM Name: Neodymium Standard Solution
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SECTION I. MATERIAL IDENTIFICATION

Material Name: Neodymium Standard Solution

Description: SRM 3135a is a single element solution prepared gravimetrically to contain a nominal 10 mg/g of neodymium with a nitric acid volume fraction of 10 %.

Other Designations: Neodymium in Nitric Acid (aqua fortis; hydrogen nitrate; azotic acid; engravers acid); Neodymium Nitrate* (neodymium (+3) salt; neodymium III nitrate) in Standard Solution

Name	Chemical Formula	CAS Registry Number
Nitric Acid	HNO ₃	7697-37-2
Neodymium Nitrate	Nd(NO ₃) ₃	13746-96-8
Neodymium	Nd	7440-00-8

DOT Classification: Nitric Acid, Solution, UN2031

Manufacturer/Supplier: It is available from a number of suppliers.

* The addition of neodymium to nitric acid, along with other intermediate chemical reactions, forms neodymium nitrate which will precipitate upon evaporation or drying of the solution.

SECTION II. HAZARDOUS INGREDIENTS

Hazardous Components	Nominal Concentration (%)	Exposure Limits and Toxicity Data
Nitric Acid	10	ACGIH TLV-TWA: 2 mg/kg or 5 mg/m ³
		OSHA TLV-TWA: 2 mg/kg or 5 mg/m ³
		Human, Oral: LD _{LO} : 430 mg/kg
Neodymium Nitrate	2.3	No ACGIH TLV-TWA established
		Rat, Oral: LD ₅₀ : 2072 mg/kg
		Rat, Intravenous: LD ₅₀ : 4800 µg/kg
Neodymium	1	No ACGIH TLV-TWA established

SECTION III. PHYSICAL/CHEMICAL CHARACTERISTICS

Nitric Acid	Neodymium Nitrate	Neodymium
Appearance and Odor: a colorless to slightly yellow liquid that darkens to a brownish color upon aging and exposure to light; a pungent odor	Appearance and Odor: a lavender, crystalline powder	Appearance and Odor: a silvery-gray metal that becomes yellowish on exposure to air
Relative Molecular Mass: 63.02	Relative Molecular Mass: 330.25	Relative Atomic Mass: 144.24
Density: 1.0543 (10 % nitric acid)	Density: not available	Density: 7.0
Solubility in Water: soluble	Solubility in Water: soluble	Solubility in Water: decomposes
Solvent Solubility: decomposes in alcohol	Solvent Solubility: soluble in alcohol and acetone	Solvent Solubility: soluble in dilute acids

NOTE: The physical and chemical data provided are for the pure components. Physical and chemical data for this neodymium/nitric acid solution do not exist. The actual behavior of the solution may differ from the individual components.

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point: N/A

Method Used: N/A

Autoignition Temperature: N/A

Flammability Limits in Air (Volume %):	UPPER:	N/A
	LOWER:	N/A

Unusual Fire and Explosion Hazards: Although nitric acid does not burn, it is a powerful oxidizing agent that can react with combustible materials to cause fires. Neodymium and neodymium nitrate are negligible fire hazards when exposed to heat or flames. Neodymium nitrate produces a fire and explosion hazard with combustibles and organic materials.

Extinguishing Media: Use extinguishing media that is appropriate to the surrounding fire. Use a water spray to dilute nitric acid and to absorb liberated oxides of nitrogen.

Special Fire Procedures: Fire fighters should wear a self-contained breathing apparatus (SCBA) with a full face piece in the pressure demand or positive mode and other protective clothing.

SECTION V. REACTIVITY DATA

Stability: X **Stable** **Unstable**

Conditions to Avoid: Avoid heat, flames, and other sources of ignition. Avoid contact with incompatible materials.

Incompatibility (Materials to Avoid): Keep nitric acid away from organic materials, plastics, rubber and some forms of coatings. Nitric acid is incompatible with chlorine and metal ferrocyanide. Avoid contact with acids, bases, amines, halogens, halocarbons, cyanides, metals, metal oxides, metal salts, metal carbides, peroxides, oxidizing materials, and reducing agents.

See Section IV: *Unusual Fire and Explosion Hazards*

Hazardous Decomposition or Byproducts: Hazardous decomposition of nitric acid and/or neodymium nitrate can produce various nitrogen oxides, including nitric oxide (NO), nitrogen dioxide (NO₂), nitrous oxide (N₂O), as well as nitric acid mist or vapor. Thermal decomposition of neodymium may release toxic and/or hazardous gases of neodymium oxides.

Hazardous Polymerization: ☐ Will Occur ☒ Will Not Occur

SECTION VI. HEALTH HAZARD DATA

Route of Entry: X Inhalation X Skin X Ingestion

Health Hazards (Acute and Chronic): Nitric Acid: Nitric acid may be fatal if inhaled, swallowed, or absorbed through the skin. This material causes burns and is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin. Inhalation may be fatal as a result of spasm, inflammation, and edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting.

Neodymium and Neodymium Nitrate: Inhalation of neodymium and its compounds may cause irritation to the respiratory tract. Inhalation of sufficient amounts of rare earth materials, such as neodymium and neodymium nitrate, may result in a sensitivity to heat, itching, and an increased awareness of odor and taste. Skin exposure of rare earth materials to intact skin are unlikely to cause irritation.

Neodymium and neodymium nitrate, like other rare earth materials, have low expected toxicity evaluations for ingestion. Poisoning due to neodymium and neodymium compounds may result in drowsiness, anorexia, nausea, vomiting, a metallic taste, itching, and bone marrow depression leading to anemia. In addition to these general effects, neodymium nitrate may cause central nervous system and blood damage, with subsequent renal damage. Rare earth compounds may affect the blood's ability to clot.

Medical Conditions Generally Aggravated by Exposure: Nitric Acid may aggravate eye disorders, skin disorders, respiratory disorders, and allergies. Neodymium nitrate may cause heart or cardiovascular disorders and respiratory disorders.

Listed as a Carcinogen/Potential Carcinogen:

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens	<u> </u>	<u> X </u>
In the International Agency for Research on Cancer (IARC) Monographs	<u> </u>	<u> X </u>
By the Occupational Safety and Health Administration (OSHA)	<u> </u>	<u> X </u>

EMERGENCY AND FIRST AID PROCEDURES:

Skin Contact: Remove contaminated shoes and clothing. Rinse affected area with large amounts of water followed by washing the area with soap and water. Watch for chemical irritations and treat them accordingly. Obtain medical assistance.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Obtain medical assistance.

Inhalation: If inhaled, move the victim to fresh air. If breathing is difficult, give oxygen; if the victim is not breathing, give artificial respiration. Obtain medical assistance if necessary.

Ingestion: If ingestion occurs, wash out mouth with water. **DO NOT** induce vomiting. Obtain medical assistance immediately.

NOTE TO PHYSICIAN (Nitric Acid): Wash affected skin areas with 5 % solution of sodium bicarbonate (NaHCO_3). If ingested, the risk versus the benefit of the passage of a naso-gastric tube is debatable. Activated charcoal is of no value. **DO NOT** give the exposed person bicarbonate to neutralize the material.

TARGET ORGAN(S) OF ATTACK: **Nitric Acid:** skin, teeth, eyes, and upper respiratory tract
Neodymium and Neodymium Nitrate: the blood system

SECTION VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken in Case Material is Released or Spilled: Notify safety personnel of spills. Surfaces contaminated with spills should be covered with soda ash or sodium bicarbonate to neutralize the acid. Place the neutralized material into containers suitable for eventual disposal, reclamation, or destruction.

Waste Disposal: Follow all federal, state, and local laws governing disposal.

Handling and Storage: Provide general and local explosion proof ventilation systems to maintain airborne concentrations below the TLV. Provide approved respiratory apparatus for non-routine or emergency use. Use an approved filter and vapor respirator when the vapor or mist concentrations are high. Wear gloves and chemical safety glasses where contact with the liquid or high vapor concentrations may occur. An eye wash station and washing facilities should be readily available near handling and use areas. Wash exposed skin areas several times a day with soap and warm water.

NOTE: Contact lenses pose a special problem; soft lenses may absorb irritants and all lenses concentrate them. **DO**

NOT wear contact lenses in the laboratory.

Store this material at room temperature.

SECTION VIII. SOURCE DATA/OTHER COMMENTS

Sources: MDL Information Systems, Inc., MSDS *Neodymium*, September 10, 1998.
MDL Information Systems, Inc., MSDS *Neodymium Nitrate*, September 10, 1998.
MDL Information Systems, Inc., MSDS *Nitric Acid*, June 2, 1999.
The Merck Index, 11th Ed., 1989.
The Sigma Aldrich Library of Chemical Safety Data, Ed. II, 1988.

Disclaimer: Physical and chemical data contained in this MSDS are provided only for use in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data on the MSDS. The certified value for this material is given on the NIST Certificate of Analysis.